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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/568,967

03/14/2006

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06096/HG

8880

1933 7590 01/11/2010  
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EXAMINER

WILSON, MICHAEL H

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

01/11/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/568,967	<b>Applicant(s)</b> TAKA ET AL.	
	<b>Examiner</b> MICHAEL WILSON	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-30 is/are rejected.
- 7) ☒ Claim(s) 31 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 24 November 2009 has been entered.

### ***Response to Amendment***

2. This Office action is in response to Applicant's amendment filed 24 November 2009, which cancels claim 2 and adds new claims 28-31.

Claims 1 and 3-31 are pending.

3. The objection to claim 2 under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim is moot due to applicants cancelling of the claim in the reply filed 24 November 2009.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 1 and 11-14 are rejected under 35 U.S.C. 102(a) as being anticipated by Kita et al. (JP 2004-185967 A), machine translation relied upon.

Regarding claim 1, Kita et al. disclose an organic electroluminescent element comprising a cathode and an anode having therebetween at least one organic compound layer [0143]. The reference discloses the organic compound layer comprises a polymer ([0013]-[0014]) meeting instant formula (1) wherein Ar<sub>1</sub> is phenylcarbazole and L<sub>1</sub> is oxygen ([0061] A-24, page 15).

Regarding claims 11-14, Kita et al. disclose all the claim limitations as set forth above. Additionally the reference discloses wherein the element emits white light ([0197], full color display), is part of an illuminator and a liquid crystal cell as a display means [0198].

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. Claims 3-7, 9, 10, 15-17, 19-21, 23-25, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Tokito et al. (US 2003/0091862 A1).

Regarding claims 3-7, 9 and 10, Takimoto et al. discloses an organic electroluminescent element comprising a cathode and an anode (column 2, lines 16-20) with at least one organic compound layer between the electrodes comprising a polymer (column 2, lines 53-60) with arylene units  $Ar_2$  (column 8, lines 45-65) and  $L_2$  units O, S, Se, or Te (column 2, line 59), and wherein n is not less than 2 (column 2, line 59). Additionally the reference discloses wherein  $Ar_1$  has no more than 5 rings (compounds A1 to A5, column 8, lines 45-65). The reference also discloses wherein a layer of the element comprises two more or more polymers in the light emitting layer (column 12, lines 13-20). However the reference does not explicitly disclose the polymer containing pendent chains attached to  $Ar_2$ .

Tokito et al. teach a similar organic polymer electroluminescent device (abstract). The reference teaches attaching pendent chains of hole transporting compounds [0090], such as carbazole ([0090] HT-1) and phenylcarbazole ([0095], first side chain in polymer P3), and phosphorescent complexes [0106] to the polymer backbone. The phosphorescent organometallic complexes are taught to have partial structures of

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instant formulae (5) and (7) ([0087], formulae R-1 and R-3). The reference teaches doing so allows for very highly efficient phosphorescence [0013].

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the hole transporting compounds and phosphorescent complexes pendent chains as taught by Tokito et al. with the polymer of Takimoto et al. One of ordinary skill in the art would reasonably expect such a combination to be suitable given both references disclose light-emitting polymers designed for use in similar electroluminescent devices. One of ordinary skill in the art would be motivated by a desire to have very highly efficient phosphorescence.

Regarding claims 15-17, 19-21, and 23-25, modified Takimoto et al. discloses all the claim limitations as set forth above. Additionally the reference discloses wherein the organic electroluminescent element emits blue, green, and red light, which produces white light (column 12, lines 13-19). The reference also discloses a display unit (column 12, line 14) and illuminator (column 11, lines 48-57) equipped with an organic electroluminescent device.

Regarding claims 28-30, modified Takimoto et al. disclose all the claim limitations as set forth above. While the reference does not explicitly disclose monomers PO-11 and PO-12 such monomers would be obvious to one of ordinary skill in the art at the time of the invention given the teachings of Takimoto et al. and Tokito et al. as a whole. Tokito et al. specifically teach both phenylcarbazole and carbazole side chains as hole transporting units ([0095] and [0097]). Takimoto et al. teach the polymer backbone of instant formula (2) and that the aryl group may be disubstituted (column 9, polymer A6).

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Given this teaching it would be readily apparent to one of ordinary skill in the art that carbazole and phenylcarbazole could be substituted onto the phenyl group of Takimoto et al. in order to give a hole transporting unit, as taught by Tokito et al., resulting to the presently claimed PO-11 and PO-12 monomers. While the substitution pattern of polymer A6 of Takimoto et al. PO-11 is different (para vs. meta) the monomer of modified Takimoto et al. would merely be a positional isomer to PO-11 and PO-12. Compounds which are position isomers (compounds having the same radicals in physically different positions on the same nucleus) are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977). See also *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978) (stereoisomers prima facie obvious).

9. Claims 3, 4, 6, 7, 9, 10, 15-17, 19-21, and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Ikehira et al. (US 2002/0193532 A1).

Regarding claims 3, 4, 6, 7, and 9, Takimoto et al. discloses an organic electroluminescent element comprising a cathode and an anode (column 2, lines 16-20) with at least one organic compound layer between the electrodes comprising a polymer (column 2, lines 53-60) with arylene units Ar<sub>2</sub> (column 8, lines 45-65) and L<sub>2</sub> units O, S, Se, or Te (column 2, line 59), and wherein n is not less than 2 (column 2, line 59). Additionally the reference discloses wherein Ar<sub>1</sub> has no more than 5 rings (compounds

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A1 to A5, column 8, lines 45-65). The reference also discloses wherein a layer of the element comprises two more or more polymers in the light emitting layer (column 12, lines 13-20). However the reference does not explicitly disclose the polymer containing pendent chains attached to Ar<sub>2</sub>.

Ikehira et al. teach a similar organic polymer electroluminescent device (abstract). The reference teaches attaching pendent chains of phosphorescent complexes to the polymer backbone [0044]. The phosphorescent organometallic complexes are taught to have partial structures of instant formulae (5) and (7) [0044]. The reference teaches that using the phosphorescent complexes can result in high light emitting efficiency [0284].

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the phosphorescent complexes as taught by Ikehira et al. with the polymer of Takimoto et al. One of ordinary skill in the art would reasonably expect such a combination to be suitable given both references disclose light-emitting polymers designed for use in similar electroluminescent devices. One of ordinary skill in the art would be motivated by a desire to have high light emitting efficiency.

Regarding claims 15-17, 19-21, and 23-25, modified Takimoto et al. discloses all the claim limitations as set forth above. Additionally the reference discloses wherein the organic electroluminescent element emits blue, green, and red light, which produces white light (column 12, lines 13-19). The reference also discloses a display unit (column 12, line 14) and illuminator (column 11, lines 48-57) equipped with an organic electroluminescent device.



10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Tokito et al. (US 2003/0091862 A1) as applied to claim 3 above, and further in view of Spreitzer et al. (Soluble phenyl-substituted PPVs- new materials for highly efficient polymer LEDs.).

Regarding claim 8, modified Takimoto et al. disclose all the claim limitations as set forth above. Additionally the reference discloses that Ar<sub>2</sub> may be substituted (column 7, line 67). The Tokito et al. teach attaching pendent chains of hole transporting compounds [0090], such as carbazole or phenylcarbazole ([0095], first side chain in polymer P3). However the reference does not explicitly disclose wherein Ar<sub>2</sub> is substituted by an additional phenyl group.

Spreitzer et al. teach a similar polymer designed for light-emitting devices (paragraph 1, page 1340) the reference teaches binding an alkoxy substituted phenyl to the polymer improves solubility and mechanical stability (paragraph 3, lines 5-10).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the alkoxy substituted phenyl substituent with the polymer of modified Takimoto et al. One of ordinary skill in the art would reasonably expect such a combination to be suitable given that Spreitzer et al. teach the substituent for polymers used in electroluminescent devices. One of ordinary skill in the art would be motivated by a desire to improve solubility and mechanical stability of the polymer.

Additionally it would be obvious to one of ordinary skill in the art at the time of the invention to place the substituent of Spreitzer et al. in the Ar position shown in instant

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formula (22). One of ordinary skill in the art would be directed to use the position meta (the position of Ar) or para to the hole transporting group by steric considerations. One of ordinary skill in the art would further be guided in the selection between the two possible positions (meta or para) by the specific effects the position would have on the physical properties of the polymer.

11. Claims 18, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Tokito et al. (US 2003/0091862 A1) as applied to claims 17, 21, and 25 above, and further in view of Lee (US 2002/0079835 A1).

Regarding claims 18, 22, and 26, modified Takimoto et al. disclose all the claim limitations as set forth above. Additionally the reference also discloses a display unit (column 12, line 14) and illuminator (column 11, lines 48-57) equipped with an organic electroluminescent device. However the reference does not explicitly disclose a display equipped with a liquid crystal cell as a display means.

Lee teaches a similar electroluminescent device (abstract). The reference teaches an electroluminescent device may be used as a backlight for a liquid crystal display (LCD) panel.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the LCD panel with the device of modified Takimoto et al as taught by Lee. One of ordinary skill in the art would be motivated by a desire to utilize the device of modified Takimoto et al.

12. Claims 18, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Ikehira et al. (US 2002/0193532 A1) as applied to claims 17, 21, and 25 above, and further in view of Lee (US 2002/0079835 A1).

Regarding claims 18, 22, and 26, modified Takimoto et al. disclose all the claim limitations as set forth above. Additionally the reference also discloses a display unit (column 12, line 14) and illuminator (column 11, lines 48-57) equipped with an organic electroluminescent device. However the reference does not explicitly disclose a display equipped with a liquid crystal cell as a display means.

Lee teaches a similar electroluminescent device (abstract). The reference teaches an electroluminescent device may be used as a backlight for a liquid crystal display (LCD) panel.

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the LCD panel with the device of modified Takimoto et al as taught by Lee. One of ordinary skill in the art would be motivated by a desire to utilize the device of modified Takimoto et al.

13. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takimoto et al. (US 5,331,182 A) in view of Pei (US 2003/0013843 A1).

Regarding claim 27, Takimoto et al. discloses an organic electroluminescent element comprising a cathode and an anode (column 2, lines 16-20) with at least one

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organic compound layer between the electrodes comprising a polymer (column 2, lines 53-60) with arylene units  $Ar_2$  (column 8, lines 45-65) and  $L_2$  units O, S, Se, or Te (column 2, line 59), and wherein  $n$  is not less than 2 (column 2, line 59). Additionally the reference discloses wherein  $Ar_1$  is an aromatic or substituted aromatic group (column 5, line 66) and specifically wherein  $Ar_1$  is a phenyl group (Y1 and Y2, column 6, lines 15-20). However the reference does not explicitly disclose the polymer containing alkyl substituents.

Pei teaches a polyphenylene polymer [0009] for organic electroluminescent elements [0007]. The reference teaches specific substituents which are suitable for use on phenyl and teaches alkyl groups of the formula  $C_nH_{2n+1}$  [0084] as suitable.

It would be obvious to one of ordinary skill in the art at the time of the invention given the teaching of Pei, that phenyl may be substituted by alkyl groups, to substitute the phenyl of Takimoto et al. with an alkyl group, including 2-ethylhexyl. One of ordinary skill in the art would reasonably expect such a combination to be suitable given that Pei teaches alkyl substituents on polymers comprising phenyl groups, that Takimoto et al. teach phenyl may be substituted, and both references teach the polymers as suitable for use in active layers of electroluminescent devices. One of ordinary skill in the art would be motivated by a desire to substitute the polymer of Takimoto et al. in order to change the polymer's packing. Alkyl groups are well known to introduce steric bulk to polymers resulting in packing changes which affect certain physical properties of the polymer. One of ordinary skill in the art could readily envision each possible  $C_8$  species of the alkyl formula  $C_nH_{2n+1}$  taught by Pei and would expect all the species to have

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similar effects. Absent a showing of the criticality of 2-ethylhexyl it is the examiners position that alkyl groups, including 2-ethylhexyl would be obvious to one of ordinary skill. Further one of ordinary skill would be guided in the selection of a specific alkyl group by the amount of steric bulk desired.

### ***Allowable Subject Matter***

14. Claim 31 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

While the prior art teaches carbazole units in both the side and main chain of polymers used in organic electroluminescent devices, the prior art does not teach or suggest the azacarbazole containing unit PO-13 of claim 31, nor does the prior art give one of ordinary skill any reason or motivation to select the specific azacarbazole group over other carbazole or azacarbazole groups to arrive at PO-13.

### ***Response to Arguments***

16. Applicant's arguments filed 24 November 2009 have been fully considered but they are not persuasive.

Applicants argue regarding Kita et al. (JP 2004-185967 A) that A-24 of contains a -C(=O)- group in addition to the phenylcarbazole group and a -O- group in the main

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chain. Applicants assert that A -C(=O)- group forms an ester group in combination with an -O- group, namely, a polyester compound, which is a definitely different compound from the compound having a repeat unit represented by Formula (1) of the present application. However the present claims recite a compound layer comprising a polymer having a repeat unit represented by Formula (1). A-24 of Kita et al. clearly shows a polymer having a repeat unit which meets to requirements of instant formula (1), the formula does not exclude the polymer from having additional repeating units. A-24 has a heteroarylene group as Ar<sub>1</sub> and a L<sub>1</sub> linkage group of \*-O-\* meeting the claim limitations. The possibility of additional repeating structures is not excluded by the claim. Therefore the claims are anticipated by Kita et al. as set forth above because the reference discloses each and every limitation of the present claims 1 and 11-14.

Regarding the declaration under 1.132 and showing of unexpected results, it is well settled that evidence presented to rebut a prima facie case of obviousness must be commensurate in scope with the claims to which it pertains and that such evidence which is considerably narrower in scope than claimed subject matter is not sufficient to rebut a prima facie case of obviousness. *In re Dill*, 604 F.2d 1356, 1361, 202 USPQ805, 808 (CCPA 1979). Also see *In re Boesch*, 617 F.2d at 276, 205 USPQ at 219; *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972) and *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). As the rejected claims are significantly broader than examples in specification, which applicant cites as an example of unexpected results and which are limited to a comparison of a specific organometallic iridium complex as a light-emitting side chain, side chains containing carbazoyl groups

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as hole transporting side chains, and a single benzimidazole containing electron transporting side chain, the evidentiary showing is far from being commensurate in scope with the degree of patent protection sought given that the claims encompass all light-emitting, hole transporting, and electron transporting compounds which could be used as side chains. *In re Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1058 (fed. Cir. 1990) ("[O]bjective evidence of nonobviousness must be commensurate in scope with the claims." (quoting *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972); *In re Dill*, 604 F.2d 1356, 1361, 202 USPQ 805, 808 (CCPA 1979) ("The evidence presented to rebut a prima facie case of obviousness must be commensurate in scope with the claims to which it pertains.")). Additionally it is noted while applicants compare presently claimed polymers with polymers of polyethylene and polyphenylenevinylene (PPV) with carbazole side chains no comparison with polyphenylethers has been done.

### **Conclusion**

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL WILSON whose telephone number is (571) 270-3882. The examiner can normally be reached on Monday-Thursday, 7:30-5:00PM EST, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 1794

MHW